

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

WHAT IS CLAIMED IS:

1. A fluid injection apparatus adapted to inject fluid, comprising:
an input device;
a catheter in fluid communication with the input device; and
an improved visualization device operatively associated with
one of the input device and catheter and adapted to increase the speed with
which fluid may be injected.
2. The fluid injection apparatus of claim 1, wherein the input device
is a syringe.
3. The fluid injection apparatus of claim 2, wherein the syringe is
manually operated.
4. The fluid injection apparatus of claim 1, wherein the improved
visualization device is a heater adapted to increase the temperature of the
fluid.
5. The fluid injection apparatus of claim 1, wherein the improved
visualization device is an expandable member proximate a distal end of the
catheter.

2 6. The fluid injection apparatus of claim 1, further including a
4 manifold and a fluid line, the manifold having first and second ends and a
manifold, the fluid line being connected to one of the input ports of the
manifold.

2 7. The fluid injection apparatus of claim 6, wherein the catheter is
connected to the second end of the manifold.

2 8. The fluid injection apparatus of claim 7, wherein the fluid is
radiopaque contrast.

2 9. The fluid injection apparatus of claim 7, wherein the fluid line
includes a valve.

2 10. The fluid injection apparatus of claim 4, wherein the heater is
positioned proximate the catheter.

2 11. The fluid injection apparatus of claim 4, wherein the heater is an
electric heating coil.

2 12. The manually operated fluid injection apparatus of claim 4,
wherein the heater employs a form of heating selected from the group of
heating forms including radiant, convective, and conductive.

13. The fluid injection apparatus of claim 4, wherein the heater is
integrated into one of the syringe, fluid line, manifold, and catheter.

2

2 14. A method of manually injecting fluid, comprising the steps of:
4 retracting a plunger from a syringe cylinder and drawing fluid
into the cylinder;
6 depressing the plunger into the cylinder forcing the fluid out of
an outlet of the cylinder;
increasing the speed with which the fluid may be injected; and
injecting the fluid into a patient.

2 15. The method of manually injecting fluid of claim 14, wherein the
increasing step includes the step of reducing the viscosity of the fluid.

2 16. The method of manually injecting fluid of claim 15, wherein the
viscosity of the fluid is reduced by heating the fluid.

4 17. The method of manually injecting fluid of claim 16, wherein the
fluid is injected into the patient with a catheter, and wherein the heating step
occurs proximate the catheter.

2 18. The method of manually injecting fluid of claim 14, wherein the
increasing step is performed by constricting blood flow proximate an area of
injection.

2 19. The method of manually injecting fluid of claim 18, wherein the fluid is injected with a catheter, and wherein the blood flow is constricted by enlarging the size of the catheter.

20. A manually operated fluid injection system, comprising:
a syringe having a movable plunger;
a manifold having a plurality of input ports and first and second
ends, the syringe being connected to the first end of the manifold;
a fluid line having first and second ends, the first end of the fluid
line being connected to one of the plurality of input ports;
a catheter connected to the second end of the catheter;
a source of fluid in communication with the fluid line; and
a heater operatively associated with one of the syringe,
manifold, fluid line, catheter and source of fluid.

21. The manually operated fluid injection system of claim 20,
wherein the fluid is radiopaque contrast.

22. The manually operated fluid injection system of claim 20,
wherein a valve is interposed in the fluid line for controlling fluid flow
therethrough.

23. The manually operated fluid injection system of claim 20,
wherein the heater is integrated with one of the syringe, manifold, fluid line,
and catheter.

24. A manually operated fluid injection system, comprising:
a syringe having a movable plunger;
a manifold having a plurality of input ports and first and second
ends, the syringe being connected to the first end of the manifold;
a fluid line having first and second ends, the first end of the fluid
line being connected to one of the plurality of input ports;
a catheter connected to the second end of the catheter;
a source of fluid in communication with the fluid line; and
an expandable ring associated with the catheter, the ring being
expandable after catheter insertion and prior to injection to constrict blood
flow.

25. The manually operated fluid injection system of claim 24,
wherein the fluid is radiopaque contrast.

26. The manually operated fluid injection system of claim 24,
wherein a valve is interposed in the fluid line for controlling fluid flow
therethrough.

27. A manually operated fluid injection system, comprising:
2 a manipulable input device; and
4 a heater associated with the input device and adapted to
increase the temperature of fluid prior to injection.

28. The manually operated fluid injection system of claim 27,
2 wherein the fluid is radiopaque contrast.

29. The manually operated fluid injection system of claim 27,
2 wherein the heater is integrated into the input device.

30. The manually operated fluid injection system of claim 27,
2 wherein the heater is an electric coil.

31. The manually operated fluid injection system of claim 27,
2 wherein the heater employs a form of heating selected from the group of
heating forms including radiant, convective and conductive.

32. A manually operated fluid injection system, comprising:

2

a manipulable input device;

a catheter connected to the input device;

4

an expandable member associated with the catheter and

adapted to expand after the catheter is inserted into a patient to restrict blood
flow during injection.

6